Trend Study 16B-8-02

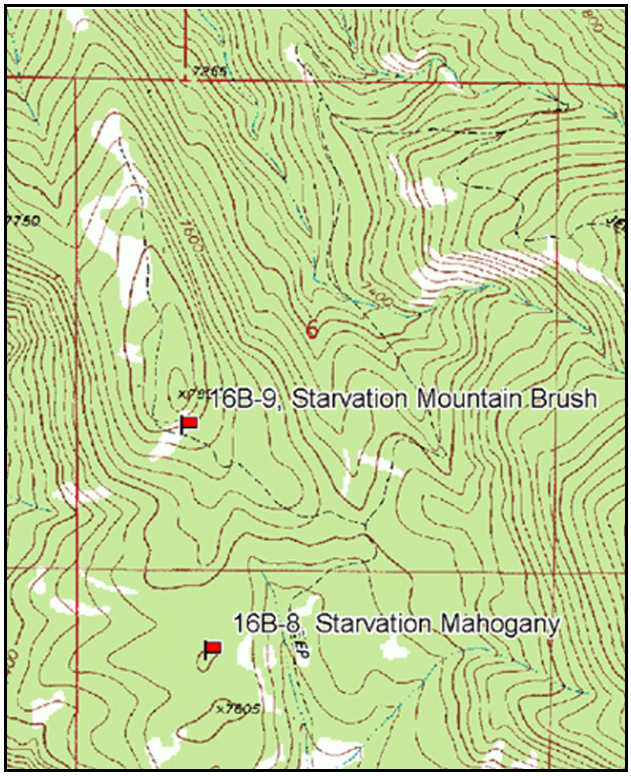
Study site name: Starvation Mahogany . Vegetation type: Curlleaf Mahogany .

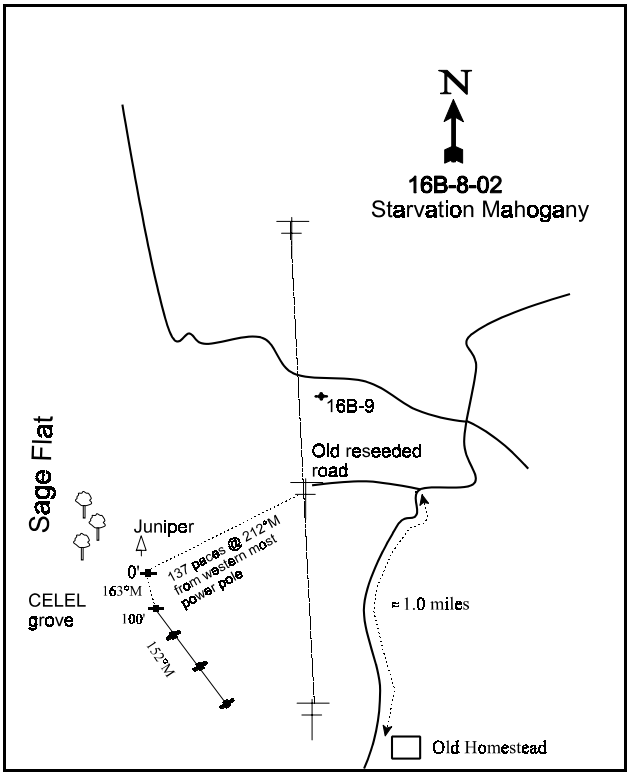
Compass bearing: frequency baseline 160 degrees magnetic (line 2-4 @ 151°M).

Frequency belts placement: line 1 (11 and 95 ft), line 2 (34 ft), line 3 (59 ft), line 4 (71ft).

LOCATION DESCRIPTION

From Tucker rest area on Highway 6 in Spanish Fork Canyon, take the Starvation Canyon road 4.6 miles. Turn left and go 0.5 miles to another fork. Turn left and go up a small canyon on a rough road for 1.15 miles to a fork. Turn left, cross the creek, and go 0.3 miles to an old homestead site. Continue up the road about 1.0 miles to an old road on the left that has been seeded over. From here, walk east to the double powerlines on the hill. From the westernmost pole, walk 137 paces at 212 degrees magnetic to the 0-foot stake of the baseline. It is marked by browse tag #9047.





Map Name: Tucker

Diagrammatic Sketch

Township 11S , Range 7E , Section 7

GPS: NAD 27, UTM 12S 4414648 N 484175 E

DISCUSSION

Starvation Mahogany - Trend Study No. 16B-8

This trend study is located on a curlleaf mahogany bench in the Starvation Creek drainage on DWR property. The site was established in 1989. It is considered important range for both mule deer and elk, with most use occurring in the winter. The site slopes gently to the southwest at an elevation of 7,600 feet. Pellet group transect data from 1999 estimated light to moderate wildlife use with 34 deer days use/acre (84 ddu/ha) and 34 elk days use/acre (84 edu/ha). Livestock use was very light with an estimated 4 cow days use/acre (9 cdu/ha). Pellet group transect data taken in 2002 estimated 58 deer days use/acre (144 ddu/ha) and 18 elk days use/acre (45 edu/ha). Livestock use remained light in 2002 at 7 cow days use/acre (16 cdu/ha). A large 4-point buck antler shed was found while hiking to the site in 1999.

The soil is a dark brown clay loam with a slightly alkaline pH (7.4). The soil has moderate depth with an estimated effective rooting depth of nearly 14 inches. There is very little rock or pavement on the surface. There is a clay layer at 10-12 inches below the surface that is about 6 inches in thickness. The stoniness index estimated by pentrometer readings is more a reflection of this clay horizon than from actual rock within the profile. Erosion is minimal with high vegetation and litter cover. Also, the majority of the roots from vegetation lie in the upper 12 inches of the profile helping to hold the soils in place. Organic matter is moderately high at 3.2%, while phosphorus levels are quite low (2.7 ppm). Phosphorus levels less than 10 ppm can be limiting to normal plant growth and development. An erosion condition class assessment was determined as slight in 2002.

The browse community at the site is diverse with 14 species being sampled. The key species include Utah serviceberry, mountain big sagebrush, true mountain mahogany, curlleaf mahogany, and bitterbrush. These key species accounted for only 27% of the total browse cover in 1997, increasing to 36% in 2002. Less preferred species such as snowberry, Gambel oak, and stickyleaf low rabbitbrush provide the majority of the browse cover. The baseline was extended in 1999 to better sample browse populations that have clumped and/or discontinuous distributions. The extension of the baseline and discontinuation of the relatively small density plots accounts for some of the big changes in population densities between sampling years for many of the shrub species. The population of serviceberry had an estimated density between 500 and 600 plants/acre in 1999 and 2002. Recruitment from young plants was high in 1999 at 52%, resulting in a slight increase in density in 2002. Reproduction remained good at 17% in 2002. Percent decadence has been low during all sampling periods, currently (‘02) at 14%. Vigor improved in 2002 with only 7% of the population displaying poor vigor. Use was moderate in 1989 and 1999, increasing in 2002 to 55% heavy use.

Mountain big sagebrush numbered about 900 plants/acre in 1999 and 2002, with most individuals occurring in more open areas. Decadency has been high in all samples, but did decline in 2002 to 33%. Young recruitment is low at 2% in 1999 and 2002. Annual growth was minimal on sagebrush in 2002 averaging less than 2 inches.

True mountain mahogany and curlleaf mahogany are currently (‘02) estimated at 740 and 300 plants/acre respectively. Curlleaf mahogany increased in density between 1999 and 2002, while true mountain mahogany remained stable. The curlleaf population consists of both tall, tree-like plants that are mostly unavailable to browsing ungulates, and smaller plants accessible to wildlife. Mature curlleaf trees are about 7 feet tall, with many being highlined. In 1999, both species had a high proportion of seedling and young plants in their populations. In 2002, no seedlings were sampled for either species, but young plants remain high for curlleaf (60%) and moderate for mountain mahogany (16%). The lack of mahogany seedlings is not surprising with the drought conditions experienced in 2002. Both species of mahogany showed heavy use in 2002, with use being more moderate in previous readings. Vigor was normal on most plants, and percent decadency low for both species in 2002.

The bitterbrush population is composed of mature, heavily utilized individuals. Density was estimated at 120 plants/acre in 1999 and 2002. Vigor was normal and decadence low. Annual growth averaged just over 1 inch for both bitterbrush and true mountain mahogany in 2002. The moderate to heavy use on mahogany and bitterbrush is expected as both have relatively low densities on this site.

The most numerous browse at the site are the less preferred species. Snowberry and Gambel oak both had densities of 2,420 plants/acre in 2002. Use has been light and vigor good for these species in the past, although Gambel oak had reduced vigor and increased decadence in 2002. A late spring frost in 2002 is the cause for these changes. Stickyleaf low rabbitbrush has the highest density with an estimated 6,300 plants/acre in 2002.

The herbaceous understory is diverse in both grasses and forbs. Fourteen species of grasses and 35 species of forbs have been sampled during the three readings. Annual species are present but occur in low frequencies. Three native species, bluebunch wheatgrass, western wheatgrass, and mutton bluegrass, are the most abundant grasses providing 70% of the grass cover in 2002. As a group, sum of nested frequency for perennial grasses remained stable between 1999 and 2002. The grasses had good size even with drought. Perennial grasses, under a light grazing regime, seem to weather drought conditions better than forbs and browse species. Hoods phlox is the most abundant forb. It occurred in over half of the sampling quadrats and provided 60% of the forb cover in 1999 and 2002. Sum of nested frequency for perennial forbs declined slightly in 2002, which is expected with drought. Annual forbs slightly increased in nested frequency in 2002, but remain insignificant.

1989 APPARENT TREND ASSESSMENT

High vegetation diversity would indicate a stable community, and considering the reproduction of desirable species, trend appears to be stable to improving. Much of the curlleaf mountain mahogany is unavailable as forage, but provides good cover. Future overutilization of the browse component could result in higher decadence, unavailability of new production, and lower reproduction. Soils are adequately protected due to high vegetation and litter cover.

1999 TREND ASSESSMENT

Trend for soil is stable. Protective ground cover provided by herbaceous vegetation and litter is high. Erosion is minimal with the gentle slope and the abundance of grasses and forbs. Trend for the key browse is stable overall. Seedling and young recruitment is high for Utah serviceberry, true mountain mahogany, and curlleaf mahogany. Percent decadence is also relatively low. These species all display evidence of moderate to heavy use. However, all these species are tolerant of higher levels of browsing and the current levels are not excessive. The main concern for the key browse on this site is the high decadency rate (43%) of mountain big sagebrush, and the number of dead plants (800 per acre). However, mountain big sagebrush only makes up about 14% of the preferred browse component (Utah serviceberry, true mountain mahogany, curlleaf mahogany, and bitterbrush). Herbaceous understory trend is stable. Sum of nested frequency for perennial grasses nearly doubled in 1999, while perennial forb sum of nested frequency decreased by 25%. Overall, the sum of nested frequency of all herbaceous perennial species remained nearly the same between 1989 and 1999.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

2002 TREND ASSESSMENT

Soil trend is stable. Erosion is minimal, and ground cover characteristics remain similar to 1999 levels. Trend for browse is stable. Even with drought in 2002, the key species show improvements in important parameters compared to 1999. Density increased or remained stable with all of the key species. Reproduction declined for serviceberry and true mountain mahogany, but remained stable for curlleaf mahogany. Mountain big sagebrush and bitterbrush already had very low reproduction prior to 2002. All of the key species have stable or improving decadency rates and vigor, which is a positive sign during periods of drought. Utilization appears to have increased on most of the key browse species. This could be due to two things. First, utilization can be overestimated during years of minimal annual growth which was the case in 2002. Low annual growth results in plants having a heavily hedged appearance making ocular utilization estimates difficult to determine. Second, use may have increased as the key species occur in relatively low densities on this site, and animals may be bunching up on key areas due to drought conditions. Trend for the herbaceous understory is stable. Perennial grasses and forbs remained nearly stable in sum of nested frequency values compared to 1999. The understory remains diverse and nearly free of annual species.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 16B, Study no: 8

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'89	'99	'02	'89	'99	'02	'99	'02
G	Agropyron cristatum	$_{b}$25	$_{a}$9	$_{ab}$13	11	3	5	.18	.39
G	Agropyron smithii	$_{a}$59	$_{b}$125	$_{b}$137	20	44	47	1.98	2.26
G	Agropyron spicatum	80	92	86	35	38	36	2.56	3.23
G	Agropyron trachycaulum	$_{b}$16	$_{a}$-	$_{a}$-	7	-	-	-	-
G	Bromus inermis	-	2	4	-	1	2	.03	.15
G	Carex spp.	9	6	17	4	3	7	.44	1.00
G	Koeleria cristata	$_{ab}$4	$_{b}$12	$_{a}$-	2	6	-	.05	-
G	Oryzopsis hymenoides	11	2	13	7	2	7	.06	.30
G	Poa fendleriana	$_{a}$22	$_{a}$52	$_{b}$83	11	20	30	.69	2.42
G	Poa pratensis	$_{a}$4	$_{b}$49	$_{a}$16	1	16	6	.88	.42
G	Poa secunda	$_{a}$-	$_{b}$11	$_{c}$25	-	6	12	.05	.16
G	Sitanion hystrix	$_{ab}$4	$_{b}$11	$_{a}$-	2	5	-	.10	-
G	Stipa comata	-	2	8	-	1	3	.00	.33
G	Stipa lettermani	37	43	21	18	18	10	.79	.51
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		271	416	423	118	163	165	7.87	11.19
Total for Grasses		271	416	423	118	163	165	7.87	11.19

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'89	'99	'02	'89	'99	'02	'99	'02
F	Achillea millefolium	6	3	-	2	1	-	.15	-
F	Agoseris glauca	-	-	6	-	-	4	-	.04
F	Antennaria rosea	$_{a}$-	$_{ab}$4	$_{b}$14	-	1	6	.15	.39
F	Arabis spp.	1	3	2	1	1	2	.00	.01
F	Aster chilensis	$_{b}$57	$_{a}$16	$_{b}$25	23	5	11	.12	.13
F	Astragalus convallarius	26	23	21	13	12	11	.19	.16
F	Astragalus miser	-	1	2	-	1	1	.03	.15
F	Astragalus spp.	9	9	10	6	3	5	.01	.07
F	Calochortus nuttallii	-	1	3	-	1	1	.00	.00
F	Chaenactis douglasii	9	2	1	6	2	1	.01	.00
F	Cirsium spp.	$_{b}$30	$_{a}$13	$_{a}$12	15	6	6	.05	.07
F	Comandra pallida	$_{b}$20	$_{b}$15	$_{a}$-	7	6	-	.10	-
F	Collinsia parviflora (a)	-	$_{a}$-	$_{b}$41	-	-	15	-	.10
F	Draba spp. (a)	-	3	-	-	2	-	.01	-
F	Erigeron spp.	-	-	3	-	-	1	-	.00
F	Eriogonum racemosum	-	-	-	-	-	-	-	.01
F	Eriogonum umbellatum	20	12	15	12	7	7	.08	.11
F	Ipomopsis aggregata	3	-	-	1	-	-	-	-
F	Lomatium spp.	3	5	4	1	2	2	.33	.21
F	Machaeranthera canescens	$_{b}$95	$_{a}$42	$_{a}$27	45	18	13	.16	.19
F	Microsteris gracilis (a)	-	-	7	-	-	3	-	.01
F	Orthocarpus spp. (a)	-	6	2	-	3	2	.04	.01
F	Penstemon caespitosus	$_{a}$-	$_{c}$31	$_{b}$21	-	15	9	.46	.41
F	Penstemon cyananthus	$_{b}$69	$_{a}$7	$_{b}$51	31	3	27	.04	1.15
F	Penstemon humilis	$_{b}$31	$_{a}$3	$_{a}$-	16	1	-	.00	-
F	Penstemon spp.	$_{a}$-	$_{b}$58	$_{a}$-	-	28	-	1.00	-
F	Phlox hoodii	$_{b}$154	$_{ab}$129	$_{a}$125	62	53	56	4.45	5.38
F	Phlox longifolia	4	6	9	2	2	5	.01	.05
F	Polygonum douglasii (a)	-	4	1	-	2	1	.01	.00
F	Senecio multilobatus	$_{b}$8	$_{a}$-	$_{b}$10	5	-	6	-	.05
F	Solidago spp.	-	2	-	-	2	-	.03	-
F	Taraxacum officinale	$_{a}$-	$_{b}$17	$_{ab}$4	-	6	2	.03	.01
F	Tragopogon dubius	-	-	2	-	-	1	-	.00
F	Viguiera multiflora	1	3	3	1	1	1	.00	.03
F	Zigadenus paniculatus	-	-	-	-	-	-	-	.00
Total for Annual Forbs		0	13	51	0	7	21	0.06	0.12
Total for Perennial Forbs		546	405	370	249	177	178	7.47	8.67
Total for Forbs		546	418	421	249	184	199	7.54	8.80

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Herd unit 16B, Study no: 8

Type	Species	Strip Frequency '99	Strip Frequency '02	Average Cover % '99	Average Cover % '02
B	Amelanchier utahensis	21	25	.77	1.20
B	Artemisia tridentata vaseyana	34	34	.98	2.24
B	Cercocarpus ledifolius	8	14	.79	1.70
B	Cercocarpus montanus	24	28	3.63	3.87
B	Chrysothamnus depressus	2	4	.53	.33
B	Chrysothamnus viscidiflorus viscidiflorus	62	74	3.77	5.45
B	Gutierrezia sarothrae	14	16	.45	1.14
B	Juniperus scopulorum	0	0	-	.00
B	Mahonia repens	33	31	2.75	2.49
B	Opuntia fragilis	4	3	-	.00
B	Purshia tridentata	6	6	1.23	1.61
B	Quercus gambelii	14	17	4.83	2.41
B	Symphoricarpos oreophilus	57	54	6.97	6.71
B	Tetradymia canescens	13	16	.33	.33
Total for Browse		292	322	27.06	29.51

CANOPY COVER -- LINE INTERCEPT
Herd unit 16B, Study no: 8

Species	Percent Cover '99	Percent Cover '02
Amelanchier utahensis	-	1.00
Artemisia tridentata vaseyana	-	1.67
Cercocarpus ledifolius	8	4.83
Cercocarpus montanus	1	6.75
Chrysothamnus depressus	-	.17
Chrysothamnus viscidiflorus viscidiflorus	-	8.00
Gutierrezia sarothrae	-	1.33
Mahonia repens	-	2.00
Purshia tridentata	-	1.33
Quercus gambelii	7	5.58
Symphoricarpos oreophilus	-	14.08
Tetradymia canescens	-	.50

Key Browse Annual Leader Growth
Herd unit 16B , Study no: 8

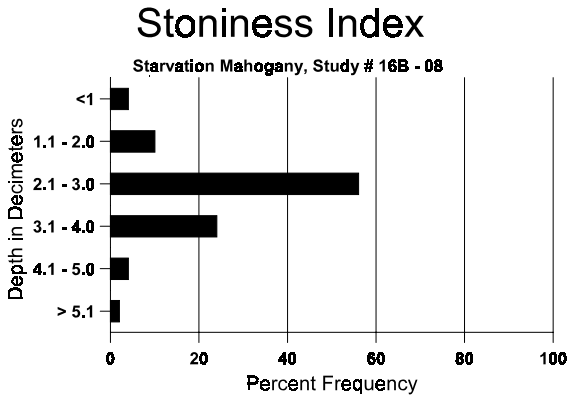
Species	Average leader growth (in) '02
Artemisia tridentata vaseyana	1.9
Cercocarpus montanus	1.3
Purshia tridentata	1.1

BASIC COVER --
Herd unit 16B, Study no: 8

Cover Type	Nested Frequency		Average Cover %		
	'99	'02	'89	'99	'02
Vegetation	335	325	16.00	39.83	46.26
Rock	91	80	1.00	5.50	3.86
Pavement	109	109	.50	.72	1.46
Litter	369	371	64.75	50.79	46.75
Cryptogams	80	41	.75	3.12	1.64
Bare Ground	227	238	17.00	17.17	18.37

SOIL ANALYSIS DATA --
Herd Unit 16B, Study # 08, Starvation Mahogany

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
13.9	46.2 (15.1)	7.4	36.7	28.7	34.6	3.2	2.7	156.8	0.7



PELLET GROUP FREQUENCY --
Herd unit 16B, Study no: 8

Type	Quadrat Frequency		Pellet Transect			
			Pellet Groups per Acre		Days Use per Acre (ha)	
	'99	'02	'99	'02	'99	'02
Rabbit	-	6	-	-	-	-
Elk	24	12	444	235	34 (84)	18 (45)
Deer	20	24	444	757	34 (84)	58 (144)
Cattle	2	2	48	78	4 (10)	7 (16)

BROWSE CHARACTERISTICS --
Herd unit 16B, Study no: 8

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Amelanchier utahensis																		
S	89	2	-	-	1	-	-	-	-	-	3	-	-	-	200			3
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	89	22	4	-	6	-	-	4	-	-	24	11	1	-	2400			36
	99	11	-	-	2	-	-	-	-	-	12	-	1	-	260			13
	02	2	1	1	-	-	-	1	-	-	5	-	-	-	100			5
M	89	-	-	-	-	-	-	2	-	-	2	-	-	-	133	31	18	2
	99	-	7	-	1	-	1	-	-	-	9	-	-	-	180	42	59	9
	02	-	3	12	5	-	-	-	-	-	20	-	-	-	400	25	29	20
D	89	1	1	-	1	-	-	-	-	-	1	1	1	-	200			3
	99	-	-	2	-	-	-	-	-	1	1	-	-	2	60			3
	02	-	-	3	-	-	-	-	1	-	2	-	1	1	80			4
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	12%	00%	05%	-82%
'99	28%	16%	12%	+14%
'02	14%	55%	07%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	2733	Dec:	7%
	'99	500		12%
	'02	580		14%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
Y	89	4	2	-	-	-	-	-	-	-	6	-	-	-	400			6
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	89	-	1	-	-	-	-	-	-	-	1	-	-	-	66	18	22	1
	99	20	5	-	1	-	-	-	-	-	26	-	-	-	520	18	24	26
	02	19	7	3	-	-	-	-	-	-	28	1	-	-	580	17	24	29
D	89	1	4	-	-	-	-	-	-	-	5	-	-	-	333			5
	99	10	5	3	2	-	-	-	-	-	15	-	-	5	400			20
	02	14	1	-	-	-	-	-	-	-	10	-	-	5	300			15
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	800			40
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	360			18

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	58%	00%	00%	+15%
'99	21%	06%	11%	- 4%
'02	18%	07%	11%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	799	Dec:		42%
'99	940			43%
'02	900			33%

Cercocarpus ledifolius																		
S	89	12	2	-	2	-	-	2	-	-	18	-	-	-	1200			18
	99	2	-	-	-	-	-	1	-	-	3	-	-	-	60			3
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	89	9	-	-	-	-	-	1	-	-	10	-	-	-	666			10
	99	4	1	-	-	-	1	-	-	-	6	-	-	-	120			6
	02	1	1	6	-	-	1	-	-	-	9	-	-	-	180			9
M	89	-	-	-	-	-	-	-	6	-	6	-	-	-	400	235	146	6
	99	-	-	1	-	-	-	-	1	-	2	-	-	-	40	140	152	2
	02	-	-	1	-	-	1	-	1	2	4	-	1	-	100	27	27	5
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	1	-	-	-	-	-	-	-	-	-	1	20			1
	02	-	-	-	-	-	-	-	-	1	1	-	-	-	20			1
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	-83%
'99	11%	33%	11%	+40%
'02	07%	80%	07%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	1066	Dec:		0%
'99	180			11%
'02	300			7%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Ceanothus martinii																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	9	26	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'99	00%	00%	00%	
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	0	Dec:	-
	'99	0		-
	'02	0		-

Cercocarpus montanus																		
S	89	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	99	4	-	-	1	-	-	-	-	-	5	-	-	-	100			5
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	89	14	8	1	5	-	-	4	-	-	24	8	-	-	2133			32
	99	11	4	1	2	3	-	-	-	-	21	-	-	-	420			21
	02	4	-	-	1	-	1	-	-	-	6	-	-	-	120			6
M	89	-	6	-	3	-	-	-	-	-	9	-	-	-	600	30	20	9
	99	2	2	3	1	2	3	3	-	-	16	-	-	-	320	38	40	16
	02	6	-	13	-	4	6	-	-	-	28	-	1	-	580	24	27	29
D	89	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	1	-	-	1	-	-	-	1	-	-	1	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	36%	02%	00%	-74%
'99	30%	19%	00%	+ 0%
'02	11%	59%	05%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	2799	Dec:	2%
	'99	740		0%
	'02	740		5%

Chrysothamnus depressus																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	11	-	-	-	-	-	-	-	-	11	-	-	-	220	-	-	11
	02	14	-	-	-	-	-	-	-	-	14	-	-	-	280	3	11	14

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'99	00%	00%	00%	+21%
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	0	Dec:	-
	'99	220		-
	'02	280		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
Y	89	60	-	-	-	-	-	-	-	-	60	-	-	-	4000			60
	99	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
	02	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
M	89	18	-	-	-	-	-	-	-	-	18	-	-	-	1200	11	12	18
	99	220	-	-	2	-	-	-	-	-	222	-	-	-	4440	12	15	222
	02	292	-	-	1	-	-	1	-	-	290	4	-	-	5880	10	15	294
D	89	6	-	-	-	-	-	-	-	-	5	-	-	1	400			6
	99	6	-	-	-	-	-	-	-	-	4	-	-	2	120			6
	02	9	1	-	-	-	-	-	-	-	10	-	-	-	200			10
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	01%	-15%
'99	00%	00%	.83%	+24%
'02	.31%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	5600	Dec:	7%
	'99	4780		3%
	'02	6300		3%

Gutierrezia sarothrae																		
S	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	89	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	99	12	-	-	-	-	-	-	-	-	12	-	-	-	240			12
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	89	4	-	-	-	-	-	-	-	-	4	-	-	-	266	8	7	4
	99	37	2	-	-	-	-	-	-	-	39	-	-	-	780	6	12	39
	02	71	-	-	-	-	-	-	-	-	71	-	-	-	1420	3	8	71

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	+61%
'99	04%	00%	00%	+29%
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	399	Dec:	-
	'99	1020		-
	'02	1440		-

Juniperus scopulorum																		
S	89	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'99	00%	00%	00%	
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	0	Dec:	-
	'99	0		-
	'02	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Mahonia repens																		
S	89	10	-	-	-	-	-	-	-	-	10	-	-	-	666			10
	99	5	-	-	3	-	-	-	-	-	8	-	-	-	160			8
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	89	143	-	-	27	-	-	13	-	-	183	-	-	-	12200			183
	99	193	-	-	13	-	-	8	-	-	214	-	-	-	4280			214
	02	27	-	-	1	-	-	-	-	-	28	-	-	-	560			28
M	89	27	-	-	-	-	-	-	-	-	27	-	-	-	1800	4	4	27
	99	225	-	-	15	-	-	41	-	-	276	5	-	-	5620	4	4	281
	02	328	-	-	44	-	-	-	-	-	348	24	-	-	7440	3	4	372
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	-29%
'99	00%	00%	00%	-18%
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	14000	Dec:	0%
	'99	9900		0%
	'02	8100		1%

Opuntia fragilis																		
S	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	02	2	-	-	1	-	-	-	-	-	3	-	-	-	60			3
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4	9	3
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'99	00%	00%	14%	-43%
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	0	Dec:	0%
	'99	140		14%
	'02	80		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Pinus edulis																		
Y	89	1	-	-	-	-	-	-	-	-	-	-	1	-	66			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'89	00%	00%	100%
'99	00%	00%	00%
'02	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	66	Dec:	-
	'99	0		-
	'02	0		-

Purshia tridentata																		
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	1	-	-	-	1	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	89	-	-	2	1	-	-	-	-	-	2	-	1	-	200	14	23	3
	99	1	2	-	-	-	-	-	-	1	4	-	-	-	80	17	44	4
	02	-	1	5	-	-	-	-	-	-	6	-	-	-	120	13	31	6
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	1	-	-	-	-	-	-	1	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	67%	33%	-40%
'99	33%	50%	00%	+ 0%
'02	17%	83%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	200	Dec:	0%
	'99	120		17%
	'02	120		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Quercus gambelii																		
S	89	1	-	-	1	-	-	-	-	-	-	2	-	-	133			2
	99	7	-	-	9	-	-	9	-	-	25	-	-	-	500			25
	02	-	-	-	2	-	-	-	-	-	2	-	-	-	40			2
Y	89	9	-	-	1	-	-	-	-	-	-	10	-	-	666			10
	99	29	-	-	17	-	-	7	-	-	53	-	-	-	1060			53
	02	25	-	-	2	-	-	-	-	-	27	-	-	-	540			27
M	89	-	-	-	-	-	-	-	1	-	1	-	-	-	66	177	39	1
	99	32	-	-	5	-	-	-	7	-	37	7	-	-	880	86	38	44
	02	50	1	1	7	-	-	-	5	-	63	-	1	-	1280	46	20	64
D	89	6	-	-	-	-	-	-	-	-	-	6	-	-	400			6
	99	-	-	-	1	1	-	-	-	-	-	2	-	-	40			2
	02	26	-	-	-	-	-	-	4	-	10	-	-	20	600			30
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	220			11
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	240			12

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	+43%
'99	01%	00%	00%	+18%
'02	.82%	.82%	17%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	1132	Dec:	35%
	'99	1980		2%
	'02	2420		25%

Symphoricarpos oreophilus																		
S	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	89	55	5	-	23	-	-	6	-	-	81	8	-	-	5933			89
	99	37	-	-	3	-	-	-	-	-	40	-	-	-	800			40
	02	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	89	35	6	-	4	-	-	1	-	-	45	1	-	-	3066	17	20	46
	99	85	-	-	19	-	-	5	-	-	109	-	-	-	2180	17	38	109
	02	88	-	15	4	-	-	-	-	-	107	-	-	-	2140	13	32	107
D	89	15	5	-	4	-	-	-	-	-	23	-	-	1	1600			24
	99	7	-	-	-	-	-	-	-	-	5	-	-	2	140			7
	02	7	-	1	-	-	-	1	-	-	5	-	2	2	180			9

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	10%	00%	.62%	-71%
'99	00%	00%	01%	-22%
'02	00%	13%	03%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	10599	Dec:	15%
	'99	3120		4%
	'02	2420		7%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Tetradymia canescens																		
Y	89	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	89	2	-	-	-	-	-	-	-	-	2	-	-	-	133	16	12	2
	99	10	-	-	-	-	-	-	-	-	10	-	-	-	200	12	15	10
	02	13	1	-	2	-	-	-	-	-	16	-	-	-	320	10	14	16
D	89	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	99	2	-	-	1	-	-	-	-	-	3	-	-	-	60			3
	02	1	-	-	-	-	-	1	-	-	1	-	-	1	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	-20%
'99	00%	00%	00%	+16%
'02	05%	00%	05%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	399	Dec:	33%
	'99	320		19%
	'02	380		11%